



7. A regeneration system as described in Claim 2 including means for protecting the microwave sources from exhaust and an engine for producing the exhaust connected to the cavity.

8. A regeneration system as described in Claim 7 wherein the exhaust protecting means includes windows disposed between the cavity and the microwave sources.

9. A regeneration system as described in Claim 2 including control means for turning the microwave sources on or off at desired intervals and in any desired sequence.

10. A regeneration system as described in Claim 2 including means for optimizing coupling of the microwaves from the microwave sources to the cavity and the filter.

11. A regeneration system as described in Claim 10 wherein the optimizing means includes 3-stub or iris tuners.

12. A regeneration system as described in Claim 2 including diagnostics are used to monitor the filter.

13. A regeneration system as described in Claim 12 wherein the diagnostics include thermocouples, optical pyrometers or imagers.

14. A regeneration system comprising:

at least one microwave source for producing microwaves;

a microwave cavity having a plurality of ports through which microwaves from the microwave source enter the cavity; and

a particulate filter disposed in the cavity which is heated by the microwaves.

15. A method for regenerating a particulate filter comprising the steps of:

passing exhaust through the particulate filter; and

heating the particulate filter from a plurality of directions with microwaves.